

Listing of Claims:

Claims 1 - 18 are pending in this application. Please cancel claims 14, 16 and 18 without prejudice or disclaimer.

This listing of claims will replace all prior versions, and listings, of claims in the application.

Claim 1 (currently amended): A cooling apparatus for use with an optical element including a base having a reflecting surface to be illuminated by light and a concave part opposite to the reflecting surface, said cooling apparatus comprising a cooling mechanism, located in the concave part of the optical element, for cooling the optical element through radiation in a non-contact manner.

Claim 2 (currently amended): An optical element comprising:

a base having a reflecting surface to be illuminated by light, and a first concave part opposite to the reflecting surface; and

a cooling mechanism, located in the first concave part, for cooling said base through radiation in a non-contact manner.

Claim 3 (original): An optical element according to claim 2, wherein the surface has an area to be illuminated, and the first concave part is located opposite to the area on the surface.

Claim 4 (original): An optical element according to claim 2, wherein said cooling mechanism includes:

a radiation plate provided opposite to the base; and

a Peltier element that cools the radiation plate.

Claim 5 (original): An optical element according to claim 4, wherein said cooling mechanism has a channel for coolant to flow, and further includes a cooling jacket for recovering heat from the Peltier element.

Claim 6 (original): An optical element according to claim 2, wherein said cooling mechanism further includes a heat insulator for preventing the base from absorbing heat obtained by the first concave part.

Claim 7 (original): An optical element according to claim 2, wherein the base has a second concave part provided at a position different from that of the first concave part in a non-illuminated area.

Claim 8 (original): An optical element according to claim 7, wherein the second concave part is opposite to the non-illuminated area on the surface to be illuminated.

Claim 9 (original): An optical element according to claim 3, wherein an interval between the area to be illuminated and the first concave part is made almost constant.

Claim 10 (original): An optical element according to claim 3, wherein the first concave part has a shape that changes according to temperature distributions on the surface to be illuminated.

Claim 11 (original): An optical element according to claim 3, wherein the cooling mechanism changes cooling power based on a position according to temperature distributions on the surface to be illuminated.

Claim 12 (original): An optical element according to claim 2, further comprising a mirror.

Claim 13 (original): An optical element according to claim 2, further comprising:

a detector for detecting a temperature of said base; and

a controller for controlling said cooling mechanism so that the temperature of said base detected by said detector becomes a predetermined value.

Claim 14 (original): An optical element comprising a surface to be illuminated by light, said optical element having a concave part opposite to the surface.

Claim 15 (currently amended): An exposure apparatus comprising an optical system for exposing a pattern formed on a mask or a reticle onto an object, wherein said optical system includes an optical element, and the optical element includes a base having a reflecting surface to be illuminated by light, and a first concave part opposite to the reflecting surface, and a cooling mechanism, located in the first concave part, for cooling said base through radiation in a non-contact manner.

Claim 16 (original): An exposure apparatus comprising an optical system for exposing a pattern formed on a mask or a reticle onto an object, wherein said optical system includes an optical element, and the optical element has a surface to be illuminated by light, and a concave part opposite to the surface.

Claim 17 (currently amended): A device fabricating method comprising the steps of:

exposing a pattern on a mask or a reticle onto an object using an exposure apparatus that includes an optical system, wherein said optical system includes an optical element, and the optical element includes a base having a reflecting surface to be illuminated by light, and a first concave part opposite to the reflecting surface, and a cooling mechanism, located in the first concave part, for cooling said base through radiation in a non-contact manner; and

developing the exposed object.

Claim 18 (original): A device fabricating method comprising the steps of:

exposing a pattern on a mask or a reticle onto an object using an exposure apparatus that includes an optical system, wherein said optical system includes an optical element, and the optical element has a surface to be illuminated by light, and a concave part opposite to the surface; and

developing the exposed object.